

**A REVIEW ON MUCORMYCOSIS BLACK AND WHITE PHASE OF FUNGUS**SAKSHI KULKARNI<sup>1</sup>, ANUJA BHOSALE<sup>2</sup><sup>1</sup>Department of Pharmaceutical Quality Assurance, M.G.V's Pharmacy College, Panchavati, Nashik, Maharashtra, India. <sup>2</sup>Department of Pharmaceutical Chemistry, M.G.V's Pharmacy College, Panchavati, Nashik, Maharashtra, India. Email: sakshikul2405@gmail.com

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**ABSTRACT**

Mucormycosis started during COVID 19 when patients were treated with number of steroids oxygen, that further lead to increase in diabetes mellitus which was main cause of mucormycosis increase in black fungus further caused rhino-orbito-cerebral mucormycosis and angio invasive behavior of fungal hyphae that is from Mucoraceae family is main cause of the infection increases rapidly also damages the facial tissues vigorously uncontrolled diabetes, immunosuppressive, steroids poor glycemic control are main causes MRI is a technique that is been used for observing the growth of fungal hyphae from Epidemiological data its been proven that the mucormycosis is been spreading in countries such as India, Nepal, and Bangladesh rapidly its serious health concern in future.

**Keywords:** Mucormycosis, Black fungus, MRI, Rhino-orbito -cerebral, Mucoraceae.

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**INTRODUCTION**

A rare fungal disease Mucormycosis has recently grabbed attention of all the scientist its increasing day by day first case was found in Germany in year 1876 a patient died with lung cancer which was further named as mucormycosis by Arnold Paltauf in 1885 condition was named as "Mycosis mucorina" [2]. It started in COVID19 due to excess of immunosuppressants steroids as well as oxygen therapy given to patients of COVID that further increase in glycemic level in patients uncontrolled diabetes is also one of main cause of black fungus that causes damage to facial tissues rhino-orbito-cerebral mucormycosis in patient which increased is causing death of patient India is witnessing a devastating outbreak of rhino-orbito-cerebral mucormycosis during second wave of the coronavirus disease (COVID-19) pandemic. Fungal infection mostly causes severe damage to mid-face and skull base invasive mucormycosis was seen in immune compromised individual. The mucorales causing mucormycosis are from Lichtheimia, Rhizopus, and Mucor genera, the most common ones belong to Rhizopus. The fungus needs infringed immune system to propagate its mostly observed in neutropenia, transplantation excessive iron, and predisposition to diabetes mellitus (diabetic ketoacidosis form), with greater chance in people with weaken immune system in case of traumatic injury or burn injury to skin chances of growth of infection is more in that case. Based on the site the mucormycosis its classified as rhino-orbital, cutaneous, pulmonary, disseminated, gastrointestinal, and other forms such as renal infections, endocarditis, and peritonitis with invasive models its invasive and aggressive, growing within the blood vessels causing thrombosis, and necrosis of tissues plus hematogenous fungus dissemination. To gain survival, rapid treatment with a higher dosage, tracing the suspicious candidate at the earliest is recommended, sometimes a heavy dosage of liposomal amphotericin B could not increase the life of the patient.

Mucorales species can thrive in conditions like iron by utilizing iron for its growth, and the presence of iron in the serum leads to mucormycosis and diabetic ketoacidosis. Iron levels are maintained by binding to the host proteins such as transferrin, lactoferrin, and ferritin, maintaining low iron levels in the body is a pervasive defensive mechanism of the host. The fungus obtains iron through iron permeases or siderophores present in their body and reduces ferric to soluble ferrous ions. This ferrous ion obtained in copper oxidase ferrous permease and complexes of protein, these proteins have been shown to influence the

virulence of fungal infection in the mucormycosis animal model, iron is taken from the host using heme. The Rhizopus oryzae gets iron from the hemoglobin and fungal growth increases [1,3].

**EPIDEMIOLOGICAL PROSPECTIVE**

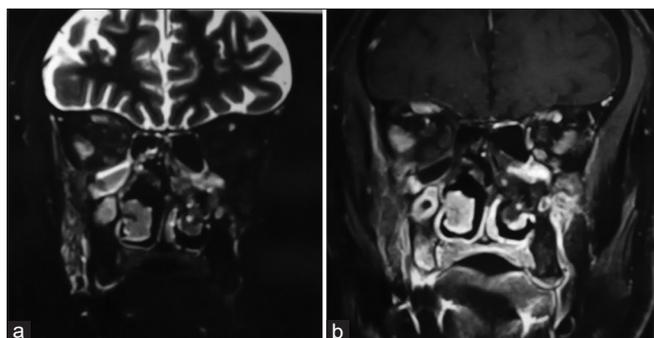
Epidemiological data regarding mucormycosis have shown that the incidence of the disease has been increasing due the availability of better diagnosis and recognition techniques and equipment and also use immunosuppressive drugs in treatment of malignancies and organ transplantation who are mostly suffering from infection. In statistical analysis of hospital discharge data, it was found that from 2000 to 2013 in the US found that the incidence of hospital admission due to mucormycosis doubled from 1.7 to 3.4 per it was found that cases were increased Indian Government declared mucormycosis as a health emergency after 153 patients have been diagnosed in Delhi, Bangladesh two COVID patients were diagnosed to be suffered from mucormycosis and both died that was due to the lack of proper diagnosis and statistical data. One study in Nepal demonstrated that COVID positive cases were spreading more rapidly in the southern part of Nepal [4].

**RADIOLOGICAL FEATURES**

MRI of mucormycosis closely reflect the angioinvasive behavior of fungal hyphae from the with invade blood vessels, cause necrotizing vasculitis, and thrombosis resulting in extensive tissue infarction. The radiological appearances of COVID-associated rhino-orbito-cerebral mucormycosis are similar to fungal rhinosinusitis historically identified in patients who are immunocompromised with poorly uncontrolled diabetes mellitus, malignancies, MRI is Magnetic Resonance Imaging technique that is used for identification of growth of fungal infections [1,2] (Fig. 1).

**TREATMENT AND IMAGE DIAGNOSIS**

Clinically, it was found radiologically suspected cases, diagnosis is validated by potassium hydroxide (KOH) preparation and its specimens obtained from the nasal cavity and paranasal sinuses that show broad aseptate of filamentous fungi its branching at right angles with tissue invasion. Amphotericin B as well as surgical debridement of sinuses, orbital exenterations, and diabetes control remain the mainstay of treatment, studies show higher survival rates



**Fig. 1: (a) MRI image of human skull infected due to fungi infection. (b) MRI image of human facial bones [1]**

in patients who were diagnosed promptly with Amphotericin B and surgical debridement of sinuses, orbital exenterations, and diabetes control remain the mainstay of treatment recent studies shows that the drug was useful one for treatment and cure of patients. The diagnosis of mucormycosis is multidimensional ranging from clinical features that lead to suspicion up to molecular diagnosis. Common clinical features due to mucormycosis are symptoms associated with pulmonary, rhinocerebral, and disseminated disease. Diplopia in a diabetic patient or pleuritic chest pain in a COVID case or the neutropenic patient may be taken into consideration. The technologies and laboratory methods can help us identify the fungi [5,6].

#### CONCLUSION

Mucormycosis has become a global concern nowadays during COVID-19 pandemic especially in those countries that have a high prevalence of diabetes mellitus. There has been a close relationship between mucormycosis and immunosuppressive therapy. On the other hand, severe COVID-19 infection has also been considered as a risk factor for mucormycosis. It is mostly due to severe COVID-19 infection and for hyperglycemia and at the same time in most cases corticosteroids have been used. In countries such as Asia, India, Nepal, Bangladesh, number of diabetic cases and number of cancer patients treated with immunosuppressive therapies are increasing day by day. The second wave of COVID-19 also came in India and Bangladesh. In future, cases of mucormycosis might become a serious health concern. Emphasis must be given on health, hygiene, and the food consumed should be proper from recovery from COVID [3,6].

#### AUTHORS CONTRIBUTION

Professor Anuja Bhosale contribution in review article was: (1) Selection of topic for review article. (2) Final approval of the version to be published.

Student Sakshi Kulkarni: (1) Searching and collecting the information for review article. (2) Drafting of the article and analysis of data.

#### CONFLICTS OF INTEREST

There are no conflicts of interest.

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